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EXAMINER	
ESHETE, ZELALEM	
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3748	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/686,766	SUZUKI ET AL.	
	Examiner	Art Unit	
	Zelalem Eshete	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3 and 5-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3 and 5-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/18;9/12-072007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office action is in response to the amendment filed on 9/6/2007.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1,3-5,7,10,16,19,25,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brothers (6,328,009) in view of Mitamura (5,085,733); and further in view of Takemura et al. (6,224,688), further in view of Takemura (6,342,109); and further in view of Ueda (JP10-204612).

Regarding claims 1,7: Brothers discloses a full type rolling bearing formed of an outer ring, an inner ring and rollers (see figures 1-9).

Brothers fails to disclose compositions of JIS-SUJ2 steel, at least one of said outer ring, inner ring and rollers are made of steel and has a carbonitrided layer in its surface layer, and the austentite crystal grain size number of the surface layer is greater than 10; and has a non-diffusible hydrogen concentration of at most 0.5 ppm.

Mitamura teaches using JIS-SUJ2 stell in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

Takemura (6,224,688) teaches at least one of said outer ring, inner ring and rollers are made of steel and has a carbonitrided layer in its surface layer, and the austentite crystal grain size number of the surface layer is greater than 10 (see abstract, column 5, lines 55 to 60). Takemura (6,224,688) further teaches such arrangement achieves long life and high reliability (see abstract).

In addition, Takemura (6,342,109) shows total (nondiffusible) hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Brothers by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling fatigue life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitded layer as taught by Takemura (6,224,688) in order to prolong life and improve reliability as taught by Takemura (6,224,688). It also would have bee obvious to one having ordinary skill in the art at the time the invention was made to further modify Brothers' device by providing hydrogen content as taught by Takemura (6,342,109)/Ueda in order to enhance the brittleness and prevent soot as taught by Takemura (6,342,109)/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 3: Takemura discloses carbide and/or nitride and an austenite phase coexist in the carbonitrided surface layer of the steel (see column 5, lines 62 to 67).

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Regarding claim 5: Takemura discloses cold working before being carbonitrided (see column 8, lines 29 to 45).

Additionally, as to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Regarding claim 10: Brothers discloses said cam follower body is mounted on one end of a rocker arm, said rocker arm is pivotably attached to a rotational shaft located between said one end and the other end, one end of an open/close valve of said engine abuts on said other end (see figures 1,2), said cam follower body on said one end has a bifurcated roller supporting portion, and said roller shaft is fixed to said bifurcated roller supporting portion (see figure 9).

Regarding claim 16: Brothers discloses a rocker arm is pivotably attached to a rotational shaft located between one end and the other end of said rocker arm (see figures 1-9), an end of an open/close valve of said engine abuts on said one end (see numeral 20), said other end abuts on one end of an interlocking rod transmitting a stress from said cam (see numeral 16), said cam follower body is mounted on the other end of said interlocking rod (see numeral 14), said one end and said other end of said interlocking rod being located respectively on said rocker arm and said cam, and said

roller shaft is attached to said cam follower body and abuts on said cam (see figures 1,2,9).

Regarding claim 19: Brothers discloses said bearing elements are full type needle bearings (see figures 1-9; column 2, lines 27 to 45).

Regarding claims 25,28: Brothers discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brothers (6,328,009) in view of Takemura et al. (6,224,688) as applied to claim 1 above; and further in view of Yoshida et al. (5,803,993).

Brothers as modified above discloses the claimed invention as recited above; however, fails to disclose a compression residual stress of at least 500 Mpa.

However, Yoshida teaches compression residual stress are controlled to 850 Mpa or higher, and this can raise fatigue strength (see column 2, lines 20 to 27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the system of Brothers by providing a residual stress of at least 850 Mpa as taught by Yoshida in order to raise the fatigue strength of the device as taught by Yoshida.

4. Claims 1,3,5,7,13,25,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Faville et al. (5,979,383) in view of Mitamura, and further in view of Takemura et al. (6,224,688); and further in view of Takemura (6,342,109), and further in view of Ueda.

Regarding claims 1,7: Faville discloses a full type rolling bearing formed of an outer ring, an inner ring and rollers (see figures 1-3).

Brothers fails to disclose compositions of JIS-SUJ2 steel, at least one of said outer ring, inner ring and rollers are made of steel and has a carbonitrided layer in its surface layer, and the austentite crystal grain size number of the surface layer is greater than 10; and has a hydrogen content of at most 0.5 ppm.

Mitamura teaches using JIS-SUJ2 steel in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

Takemura teaches at least one of said outer ring, inner ring and rollers are made of steel and has a carbonitrided layer in its surface layer, and the austentite crystal grain size number of the surface layer is greater than 11 (see abstract, column 5, lines 55 to

60). Takemura further teaches such arrangement achieves long life and high reliability (see abstract).

In addition, Takemura (6,342,109) shows the diffusible hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Faville by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling fatigue life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitded layer as taught by Takemura (6,224,688) in order to prolong life and improve reliability as taught by Takemura (6,224,688). It also would have bee obvious to one having ordinary skill in the art at the time the invention was made to further modify Faville' device by providing hydrogen content as taught by Takemura (6,342,109)/Ueda in order to enhance the brittleness and prevent soot as taught by Takemura (6,342,109)/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 3: Takemura discloses carbide and/or nitride and an austenite phase coexist in the carbonitrided surface layer of the steel (see column 5, lines 62 to 67).

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Regarding claim 5: Takemura discloses cold working before being carbonitrided (see column 8, lines 29 to 45).

Additionally, as to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence

establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Regarding claim 13: Faville discloses said cam follower body is mounted between one end and the other end of a rocker arm (see figure 1), said roller shaft is fixed in a roller hole extending between two sidewalls of the rocker arm (see figure 3), an end of an open/close valve of said engine abuts on said one end of said rocker arm, and a pivot abuts on said other end (see figure 1).

Regarding claims 25,28: Faville discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

5. Claims 1,3,5,7,10,22,25,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bando (JP63-185917) in view of Mitamura; and further in view of Takemura et al. (6,224,688); and further in view of Takemura (6,342,109), and further in view of Ueda.

Regarding claims 1,7: Bando discloses a full type rolling bearing formed of an outer ring, an inner ring and rollers (see figures 1-3).

Brothers fails to disclose composition of JIS-SUJ2 steel, at least one of said outer ring, inner ring and rollers are made of steel and has a carbonitrided layer in its surface layer, and the austentite crystal grain size number of the surface layer is greater than 10.

Mitamura teaches using JIS-SUJ2 steel in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

Takemura teaches at least one of said outer ring, inner ring and rollers are made of steel and has a carbonitrided layer in its surface layer, and the austentite crystal grain size number of the surface layer is greater than 11 (see abstract, column 5, lines 55 to 60). Takemura further teaches such arrangement achieves long life and high reliability (see abstract).

In addition, Takemura (6,342,109) shows the diffusible hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Bando by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitded layer as taught by Takemura

(6,224,688) in order to prolong life and improve reliability as taught by Takemura (6,224,688). It also would have bee obvious to one having ordinary skill in the art at the time the invention was made to further modify Bando's device by providing hydrogen content as taught by Takemura (6,342,109)/Ueda in order to enhance the brittleness and prevent soot as taught by Takemura (6,342,109)/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 3: Takemura discloses carbide and/or nitride and an austenite phase coexist in the carbonitrided surface layer of the steel (see column 5, lines 62 to 67).

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Regarding claim 5: Takemura discloses cold working before being carbonitrided (see column 8, lines 29 to 45).

Additionally, as to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Regarding claim 10: Bando discloses said cam follower body is mounted on one end of a rocker arm, said rocker arm is pivotably attached to a rotational shaft located between said one end and the other end, one end of an open/close valve of said engine abuts on said other end (see figure 4), said cam follower body on said one end has a bifurcated roller supporting portion, and said roller shaft is fixed to said bifurcated roller supporting portion (see figure 6).

Regarding claim 22: Bando discloses said roller shaft has its end with a hardness lower than that of its central portion (see abstract).

Regarding claims 25,28: Bando discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

6. Claims 8,11,17,20,26,29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brothers (6,328,009) in view of Mitamura; and further in view of Hirakawa et al. (6,012,851), and further in view of Kim et al. (Journal of Heat Treat.); and further in view of Takemura (6,342,109).

Regarding claim 8: Brothers discloses a roller cam follower of an engine (see figures 1-9), comprising: an outer ring being in rolling contact with a camshaft of the engine (see numeral 30), a roller shaft located inside said outer ring and fixed to a cam follower body (see numeral 36); and bearing elements placed between said outer ring and said roller shaft (see numerals 32,35).

Brothers fails to disclose compositions of JIS-SUJ2 steel, at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer and has a fracture stress of at least 2650 Mpa; has a hydrogen content of at most 0.5 ppm.

Mitamura teaches using JIS-SUJ2 steel in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

Hirakawa teaches at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer (see column 3, lines 52 to 58; Table 1).

In addition, Kim shows the fracture strength (stress) of carbonitrided steels can be 3220 Mpa (see abstract).

Furthermore, Takemura (6,342,109) shows the diffusible hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have bee obvious to one having ordinary skill in the art at the time the invention was made to modify Brothers' device by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling fatigue life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitided layer as taught by Hirakawa in order to improve the physical properties of the device and thereby enhance the longevity of the device in engine operation. It would have been obvious to use the greater fracture stress as taught by Kim in order to increase the longevity of the device. It also would have bee obvious to one having ordinary skill in the art at the time the

invention was made to further modify Brothers' device by providing hydrogen content as taught by Takemura (6,342,109)/Ueda in order to enhance the brittleness and prevent soot as taught by Takemura (6,342,109)/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 11: Brothers discloses said cam follower body is mounted on one end of a rocker arm, said rocker arm is pivotably attached to a rotational shaft located between said one end and the other end, one end of an open/close valve of said engine abuts on said other end (see figures 1,2), said cam follower body on said one end has a bifurcated roller supporting portion, and said roller shaft is fixed to said bifurcated roller supporting portion (see figure 9).

Regarding claim 17: Brothers discloses a rocker arm is pivotably attached to a rotational shaft located between one end and the other end of said rocker arm (see figures 1-9), an end of an open/close valve of said engine abuts on said one end (see numeral 20), said other end abuts on one end of an interlocking rod transmitting a stress from said cam (see numeral 16), said cam follower body is mounted on the other end of said interlocking rod (see numeral 14), said one end and said other end of said interlocking rod being located respectively on said rocker arm and said cam, and said roller shaft is attached to said cam follower body and abuts on said cam (see figures 1,2,9).

Regarding claim 20: Brothers discloses said bearing elements are full type needle bearings (see figures 1-9; column 2, lines 27 to 45).

Regarding claims 26,29: Brothers discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

7. Claims 9,12,18,21,27,30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brothers (6,328,009) in view of Mitamura; and further in view of Hirakawa et al. (6,012,851), and further in view of Takemura (6,342,109).

Regarding claim 9: Brothers discloses a roller cam follower of an engine (see figures 1-9), comprising: an outer ring being in rolling contact with a camshaft of the engine (see numeral 30), a roller shaft located inside said outer ring and fixed to a cam follower body (see numeral 36); and bearing elements placed between said outer ring and said roller shaft (see numerals 32,35).

Brothers fails to disclose compositions of JIS-SUJ2 steel, at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer and has a fracture stress/hydrogen content of at least/most 2650/0.5 Mpa/ppm.

Mitamura teaches using JIS-SUJ2 steel in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

However, Hirakawa teaches at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer (see column 3, lines 52 to 58; Table 1).

In addition, Takemura (6,342,109) shows the diffusible hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have bee obvious to one having ordinary skill in the art at the time the invention was made to modify Brothers' device by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling fatigue life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitided layer as taught by Hirakawa in order to improve the physical properties of the device and thereby enhance the longevity of the device in engine operation. It would have been obvious to use the hydrogen content as taught by Takemura/Ueda in order to enhance the brittleness or prevent soot as taught by Takemura/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 12: Brothers discloses said cam follower body is mounted on one end of a rocker arm, said rocker arm is pivotably attached to a rotational shaft located between said one end and the other end, one end of an open/close valve of said engine abuts on said other end (see figures 1,2), said cam follower body on said one end has a bifurcated roller supporting portion, and said roller shaft is fixed to said bifurcated roller supporting portion (see figure 9).

Regarding claim 18: Brothers discloses a rocker arm is pivotably attached to a rotational shaft located between one end and the other end of said rocker arm (see figures 1-9), an end of an open/close valve of said engine abuts on said one end (see numeral 20), said other end abuts on one end of an interlocking rod transmitting a stress from said cam (see numeral 16), said cam follower body is mounted on the other end of said interlocking rod (see numeral 14), said one end and said other end of said interlocking rod being located respectively on said rocker arm and said cam, and said roller shaft is attached to said cam follower body and abuts on said cam (see figures 1,2,9).

Regarding claim 21: Brothers discloses said bearing elements are full type needle bearings (see figures 1-9; column 2, lines 27 to 45).

Regarding claims 27,30: Brothers discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of

caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

8. Claims 8,14,26,29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Faville et al. (5,979,383) in view of Mitamura; and further in view of Hirakawa et al. (6,012,851), and further in view of Kim et al. (Journal of Heat Treat.); and further in view of Takemura (6,342,109).

Regarding claim 8: Faville discloses a roller cam follower of an engine (see figures 1-3), comprising: an outer ring being in rolling contact with a camshaft of the engine (see numeral 42), a roller shaft located inside said outer ring and fixed to a cam follower body (see numeral 58); and bearing elements placed between said outer ring and said roller shaft (see numeral 60).

Faville fails to disclose compositions of JIS-SUJ2 steel, at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer and has a fracture stress of at least 2650 Mpa and nondiffusible hydrogent content of at most 0.5 ppm.

Mitamura teaches using JIS-SUJ2 steel in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

Hirakawa teaches at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer (see column 3, lines 52 to 58; Table 1).

In addition, Kim shows the fracture strength (stress) of carbonitrided steels can be 3220 Mpa (see abstract).

Furthermore, Takemura (6,342,109) shows the diffusible hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have bee obvious to one having ordinary skill in the art at the time the invention was made to modify Faville's device by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling fatigue life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitided layer as taught by Hirakawa in order to improve the physical properties of the device and thereby enhance the longevity of the device in engine operation. It would have been obvious to use the greater fracture stress as taught by Kim in order to increase the longevity of the device. It also would have bee obvious to one having ordinary skill in the art at the time the invention was made to further modify Faville's device by providing hydrogen content as taught by Takemura (6,342,109)/Ueda in order to enhance the brittleness or prevent soot as taught by Takemura (6,342,109)/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence

establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 14: Faville discloses said cam follower body is mounted between one end and the other end of a rocker arm (see figure 1), said roller shaft is fixed in a roller hole extending between two sidewalls of the rocker arm (see figure 3), an end of an open/close valve of said engine abuts on said one end of said rocker arm, and a pivot abuts on said other end (see figure 1).

Regarding claim 26,29: Faville discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

9. Claims 9,15,27,30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Faville et al. (5,979,383) in view of Mitamura; and further in view of Hirakawa et al. (6,012,851), and further in view of Takemura (6,342,109).

Regarding claim 9: Faville discloses a roller cam follower of an engine (see figures 1-3), comprising: an outer ring being in rolling contact with a camshaft of the engine (see numeral 42), a roller shaft located inside said outer ring and fixed to a cam follower body (see numeral 58); and bearing elements placed between said outer ring and said roller shaft (see numeral 60).

Faville fails to disclose compositions of JIS-SUJ2 steel, at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer and has a non diffusible hydrogen content of at most 0.5 ppm.

Mitamura teaches using JIS-SUJ2 steel in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

Hirakawa teaches at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer (see column 3, lines 52 to 58; Table 1).

In addition, Takemura (6,342,109) shows the diffusible hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have bee obvious to one having ordinary skill in the art at the time the invention was made to modify Faville's device by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling fatigue life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitided layer as taught by Hirakawa in order to improve the physical properties of the device and thereby enhance the longevity of the device in engine operation. It would have been obvious to use the hydrogen content as taught by Takemura/Ueda in order to enhance the brittleness as taught by Takemura/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 15: Faville discloses said cam follower body is mounted between one end and the other end of a rocker arm (see figure 1), said roller shaft is fixed in a roller hole extending between two sidewalls of the rocker arm (see figure 3), an end of an open/close valve of said engine abuts on said one end of said rocker arm, and a pivot abuts on said other end (see figure 1).

Regarding claim 27,30: Faville discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

10. Claims 8,11,23,26,29, are rejected under 35 U.S.C. 103(a) as being unpatentable over Bando (JP63-185917) in view of Mitamura; and further in view of Hirakawa et al. (6,012,851), and further in view of Kim et al. (Journal of Heat Treat.), further in view of Takemura (6,342,109).

Regarding claim 8: Bando discloses a roller cam follower of an engine (see figure 4), comprising: an outer ring being in rolling contact with a camshaft of the engine, a

roller shaft located inside said outer ring and fixed to a cam follower body; and bearing elements placed between said outer ring and said roller shaft (see figure 6).

Bando fails to disclose compositions of JIS-SUJ2 steel, at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer and has a fracture stress/non-diffusible hydrogen content of at least/most 2650/0.5 Mpa/ppm.

Mitamura teaches using JIS-SUJ2 steel in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

Hirakawa teaches at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer (see column 3, lines 52 to 58; Table 1).

In addition, Kim shows the fracture strength (stress) of carbonitrided steels can be 3220 Mpa (see abstract).

Moreover, Takemura (6,342,109) shows the non-diffusible hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have bee obvious to one having ordinary skill in the art at the time the invention was made to modify Bando's device by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling fatigue life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitided layer as taught by Hirakawa in order to improve the physical properties of the device and thereby enhance the longevity of the device in engine operation. It would have been obvious to use the

greater fracture stress as taught by Kim in order to increase the longevity of the device. It also would have bee obvious to one having ordinary skill in the art at the time the invention was made to further modify Bando's device by providing hydrogen content as taught by Takemura (6,342,109)/Ueda in order to enhance the brittleness or prevent soot as taught by Takemura (6,342,109)/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 11: Bando discloses said cam follower body is mounted on one end of a rocker arm, said rocker arm is pivotably attached to a rotational shaft located between said one end and the other end, one end of an open/close valve of said engine abuts on said other end (see figure 4), said cam follower body on said one end has a

bifurcated roller supporting portion, and said roller shaft is fixed to said bifurcated roller supporting portion (see figure 6).

Regarding claim 23: Bando discloses said roller shaft has its end with a hardness lower than that of its central portion (see abstract).

Regarding claims 26,29: Bando discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

11. Claims 9,12,24,27,30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bando (JP63-185917) in view of Mitamura; and further in view of Hirakawa et al. (6,012,851), and further in view of Takemura (6,342,109), and further in view of Ueda.

Regarding claim 9: Bando discloses a roller cam follower of an engine (see figure 4), comprising: an outer ring being in rolling contact with a camshaft of the engine, a roller shaft located inside said outer ring and fixed to a cam follower body; and bearing elements placed between said outer ring and said roller shaft (see figure 6).

Bando fails to disclose compositions of JIS-SUJ2 steel, at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer and has a fracture stress/hydrogen content of at least/most 2650/0.5 Mpa/ppm.

Mitamura teaches using JIS-SUJ2 steel in order to secure a long rolling fatigue life (see column 1, lines 15 to 25).

Hirakawa teaches at least one of said outer ring, roller shaft and bearing elements has a carbonitrided layer (see column 3, lines 52 to 58; Table 1).

In addition, Takemura (6,342,109) shows the hydrogen content in carbonitrided material can be not more than 0.1 ppm in order to enhance the brittleness (see column 10, lines 15 to 25).

Furthermore, Ueda shows the total hydrogen content can be less than 0.5 ppm in order to prevent soot (see abstract; figure 1).

It would have bee obvious to one having ordinary skill in the art at the time the invention was made to modify Bando's device by providing JIS-SUJ2 steel as taught by Mitamura in order to secure a long rolling fatigue life as taught by Mitamura. It also would have been obvious to further modify by providing carbonitided layer as taught by Hirakawa in order to improve the physical properties of the device and thereby enhance the longevity of the device in engine operation. It would have been obvious to use the hydrogen content as taught by Takemura/Ueda in order to enhance the brittleness or prevent soot as taught by Takemura/Ueda.

As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a

different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A).

There is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Regarding claim 12: Bando discloses said cam follower body is mounted on one end of a rocker arm, said rocker arm is pivotably attached to a rotational shaft located between said one end and the other end, one end of an open/close valve of said engine abuts on said other end (see figure 4), said cam follower body on said one end has a bifurcated roller supporting portion, and said roller shaft is fixed to said bifurcated roller supporting portion (see figure 6).

Regarding claim 24: Bando discloses said roller shaft has its end with a hardness lower than that of its central portion (see abstract).

Regarding claims 27,30: Bando discloses the claimed invention as recited above except for caulked end and entirely press-formed. As to the method of caulking/press fitting, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)

Response to Arguments

12. Applicant's arguments with respect to claims 1,3,5-30 have been considered but are moot in view of the new ground(s) of rejection.

13. With respect to applicant's argument regarding "without heating it under vacuum": applicant's argument is not commensurate with the scope of the claim. Applicant's assertion of "without heating it under vacuum" is not reflected in the claim language.

14. With respect to applicant's argument of unexpected result: examiner has shown no evidence (emphasis added) to support the claimed unexpected result.

With respect to the argument about the manufacturing steps: As to the method of manufacturing processes, a product by process claim is rejected over a prior art product that appears to be identical, although produced by a different process, the burden is upon the applicants to come forward with evidence establishing an unobvious difference between the two. See In re Marosi, 218 USPQ 289 (Fed. Cir. 1983).

Additionally, Takemura et al. (6,440,232) shows the inherent manufacturing steps of the manufacturing process for carontriding (see figure 3A). As to the specifics of the manufacturing steps (emphasis added); there is no reason to believe the known manufacturing process wouldn't use the claimed numerical characteristic values or modify the quenching temperature for a desired size of the structure.

Exhibit: Maeda et al (6,158,263) shows a quenching temperature reduced to 800-840 degrees to adjust the size of the structure (column 3:1-14).

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zelalem Eshete whose telephone number is (571) 272-4860. The examiner can normally be reached on Monday to Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Zelalem Eshete
Primary Examiner
Art Unit 3748